APPLICATION COVER PAGE – 1 OF 2 (PROJECT BASIC CRITERIA)

Section 1: Application Cover Page; Basic Criteria
Please use this page, or re-create as is.

1. **PROJECT TYPE:** *(As mandated by the RESTORE Act, funds may only be used for one or more of the allowable uses listed below, which the County cannot amend or change. Carefully review each criteria listed below and determine if your project will achieve one or more of the allowable uses below. Projects that do not meet at least one of the allowable uses below will not be considered for funding. Check all that apply.)*

   - ☑ Restoration and protection of natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast Region.
   - ☑ Mitigation of damage to fish, wildlife, and natural resources.
   - ☐ Implementation of a federally approved marine/coastal management plan, including fisheries monitoring.
   - ☑ Workforce development and job creation.
   - ☐ Improvements to or on state parks in coastal areas affected by the Deepwater Horizon oil spill.
   - ☑ Infrastructure projects benefitting economy or ecological resources, including port infrastructure.
   - ☐ Coastal flood protection and related infrastructure.
   - ☐ Planning assistance.
   - ☐ Activities to promote tourism and seafood in the Gulf Coast region, for one or more of the following:
     - ☐ Promotion of tourism in the Gulf Region, including recreational fishing.
     - ☐ Promotion of the consumption of seafood harvested from the Gulf Coast region.

2. **CONTACT INFORMATION:** *(Include at least one name, phone number, email address, and organization name if applicable)*

- Organization: Key West Algae
- Address: 803 Elizabeth St
- City, State, Zip Code: Key West, Fl 33040
- Contact Person
  - Name: James D. Henderson
  - Title: CEO/Founder
  - Phone: (305)896-2735
  - Email Address: Jameshenderson22@gmail.com

APPLICATION COVER PAGE – 2 OF 2 (PROJECT SUMMARY)

Section 2. Application Cover Page; Project Summary Information

Please utilize this sheet or re-create, but keep format as is.

3. **Project Name:** *(Provide a short, succinct title for the project)*

Key West Algae: Renewable, Sustainable and Environmentally Responsible Energy.

4. **Project Executive Summary:** *(Provide a concise summary or abstract in the space below; do not exceed the space below.)*

Key West Algae (KWA) is a small business startup located in Key West, Fl. KWA's primary focus is the development of biologically derived energy from algal species to supplement and replace today's conventional "fossil fuel" sourced energy. Along with the production of renewable, sustainable and environmentally friendly bioenergy, namely biofuels, KWA intends to produce other high value, downstream products from algae such as fuel additives, pharmaceuticals, nutriceuticals, plastic components and fertilizers. Built into the production of these revenue streams are forward thinking advantages such as carbon (Co2) sequestration and the absorption of water pollutants like nitrates and phosphates which mitigate the environmental damages caused by commercial, industrial and government polluters,

Algae, a simple photosynthesizing plant, requires sunlight, water, nutrients and Co2 to grow. Algae naturally produce lipids which are essentially high grade vegetable oils which can be harvested and processed into biofuels using current technologies readily available on the market today. Algae for biofuels operations are carbon neutral, the algae sequester Co2 from the atmosphere and the same Co2 is released when the biofuel is consumed. This is unlike conventional fuels which introduce new Co2 into the atmosphere as a result of consumption. Algae for bioenergy also does not inflate food prices world wide such as bioenergy from soy (biodiesel) and from corn (bioethanol), algae also do not require arable land or even freshwater as polluted, brackish and saline water sources can be fed to algal species. Direct environmental benefits of using algae as a feedstock for bioenergy production also include water remediation, carbon sequestration and the mitigation of environmental pollutants and toxins.

KWA intends to scale from an initial algaculture laboratory (an aqueous form of agriculture similar to aquaculture or fish farming) with a research and development facility into an emerging bioenergy company bringing on line site specific remediation projects funded through private contracts, government grants and collaborative joint projects. Further growth will see KWA develop a continuous flow, fully automated, end to end operating agenda where nutrients are continuously introduced for remediation and high value components such as biofuels, bioplastics and fertilizers are produced from the continuous outflow of algal biomass.

5. **Range of Benefit: Does this project have a**

- ☑ Local benefit?
- ☑ Keys-wide benefit?
- ☑ Regional benefit?
- ☑ Gulf-wide benefit?

(Provide the location of the project and a brief description of the area that is benefiting; do not exceed the space below.)

KWA intends to locate it's mixed use algae culture research and development laboratory within the city limits of Key West. This initial phase of the project proposal will benefit Key West through job creation and small business development. As KWA's project grows the direct benefits to Key West and the Florida Keys will be measured by the sequestration of Co2 from the atmosphere, the absorption of pollutants present in area waters and the creation of additional jobs to implement, design, construct and monitor remediation sites throughout the Florida Keys, the Florida coastline and the Gulf of Mexico.

6. **Project Cost:** *(Provide the actual/estimated project cost, the amount being requested with this submission, and the amount of match committed to the project from any source. Please make clear the total project cost and the amount you are requesting. There is an opportunity to provide detailed cost/request/match information in the narrative section (see question 8.)*

- Total Project Cost: $ 505,000
- RESTORE Request Amount: $ 496,500 % of project cost: >98
- Secured Cash Match (committed funding from other sources): $ 0 % of project cost: 0
- In-kind Match value: $ 8,500 % of project cost: <2
- Funding Gap: $ 0 % of project cost: 0
- Anticipated Cash Match (potential funding from other sources)*: $ 0 % of project cost: 0

**These funds must be secured within 1 year of project award.*

APPLICATION PROJECT BUDGET

Section 3. Project Budget

PROJECT BUDGET		FUNDING		
Activity/ Item	**Cost**	**Anticipated RESTORE Funding**	Cash Match	In-kind Match
Planning/Design/Permitting				
Seed Financing	$25,000	$20,000	$0	$5,000
Administration*:	$750	$750	$0	$0
Planning Subtotal:	$25,750	$20,750	$0	$5,000
Construction or Project Activity(ies)				
Operating expenses	$75,000	$75,000	$0	$0
Lab Equipment/Supplies/Install	$100,000	$100,000	$0	$0
PBR Research and Development	$30,000	$30,000	$0	$0
Staffing	$125,000	$125,000	$0	$0
Administration*:	$9,900	$9,900	$0	$0
Construction Subtotal:	$339,900	$339,000	$0	$0
Monitoring				
Technical Consultation	$70,000	$66,500	$0	$3,500
Staffing	$75,000	$75,000	$0	$0
Administration*:	$4,350	$4,350	$0	$0
Monitoring Subtotal:	$149,350	$114,350	$0	$0
Project Cost				
Total Administration*:	$15,000	$15,000	$0	$0
TOTAL Project Cost:	$505,000	$496,500	$0	$8,500

Estimated Costs by Year	
Year 1	$505,000
Year 2	XXXXXX
Year 3	Unknown
Year 4	Unknown
Year 5	Unknown
Year 6	Unknown

Notes: Only complete the sections of the budget that are applicable for your project. Please refer to question 8 to provide further explanation of budget details. *The RESTORE Act places a total 3% cap on administrative expenses. We are uncertain at this point how this will be applied, how "administration" will be defined or assigned, or whether projects may even be able to include administration. We are waiting on further guidance from US Treasury rules to define this. Please keep this in mind as you develop your budget. Administrative costs typically include but may not be limited to overhead costs for basic operational functions (insurance, utilities), as well as costs associated with admin staff such as accountants, legal, etc.

7. Project Description

Key West Algae's (KWA) project proposal entails establishing an Algaculture laboratory designed for small and medium batch (25 ml-100 liters) culture production. Algaculture is a form of Aquaculture which involves the production of marine and freshwater organisms under controlled conditions..[1] These "farmed" algal cultures will be made commercially available to academic institutions, advanced biofuel research companies, prototype and commercial scale algaculture facilities along with private algae enthusiasts. Alga species to be included in KWA's culture collection will be of the highest quality available on the market with exacting standards for batch purity, density and inoculation capabilities. KWA's concentration will be on microalgae and not the more widely known macroalgae such as seaweed or kelp. From this point on references to "algae" refer to microalgae species.

KWA's project proposal also calls for an in house research and development laboratory focused on the propagation of algal species for use in the production of bioenergy, specifically biofuels. The algae will be grown in standard lab equipment and enclosed growing units known as photobioreactors (PBR). These algal species will be capable of providing renewable, sustainable and environmentally responsible biofuels, biofuel additives, plastic components, cosmetic components, pharmaceuticals, fertilizers and other downstream high value products. Major problems of today's industrialized society such as climate change, air pollution, water pollution and energy security coupled with the growing demand by consumers for renewable, sustainable and environmentally friendly sources of energy would be addressed by KWA's project proposal.

Climate change has been an emerging issue politically and in the forefront of the environmentally conscience community for decades[2]. We are now beginning to fully understand the damaging long term affects of our own actions and the actions of generations before us. We are also discovering that our current and past *inaction* have contributed greatly to climate change as well. Over a century long dependency on "fossil fuel" sourced energy has contributed to the pollution of carbon dioxide and sulfites into our atmosphere as well as depositing excess nutrients and toxins, including heavy metals, into our creeks, rivers, bays, sounds, gulfs, seas and oceans. Our continued use of fossil fuel sourced energy is the economic driver for environmentally damaging drilling, mining, hydraulic fracturing and other extraction techniques of these sources.

Air and water pollution are environmental concerns created by the overwhelming demand to supply fossil fuel derived energy to an energy hungry market. Couple this activity with mismanagement and deregulation or no regulation in the processing and consumption of fossil fuels and you arrive at today's near tipping point of environmental stability. With the development of third world nations and with the growing second world nations (such as China and India) comes a greater demand for energy and a greater detriment to local and global ecosystems. As the demand for fossil fuel energy increases exponentially over the next several decades the conventional finite supplies we currently depend on today will become more costly to extract. The pollution caused by the burning of these fossil fuels will continue to increase as these developing areas consume more and more conventional energy.

The emission of greenhouse gases (GHG) into the atmosphere by these newer polluters will speed the effects of climate change worldwide. Carbon Dioxide (Co2), for example, is readily absorbed

---

[1] National Aquaculture Association Web http://thenaa.net/

[2] US Department of State "*Fourth Climate Action Report to the UN Framework Convention on Climate Change:* Projected Greenhouse Gas Emissions" ©2007

into the ocean increasing its acidity[3] as well as the more commonly known contributions to air pollution. As the warming of our oceans and atmosphere increase this will result in rising ocean levels (ocean levels in Key West alone have risen nine inches over the last 100 years[4]). The Florida Keys are especially sensitive to the negative effects of climate change as rising sea levels and warmer waters will directly impact our tourist based economy[5].

Traditional sources of fossil fuel energy have been plagued by long term socio-economic issues. Civil unrest, government corruption, natural disaster and terrorism can lead to interruptions, shortages or even termination of the afflicted nations fossil fuel supply to market. Emerging sources of fossil fuel energy have faced technological and economic barriers which have been addressed by using environmentally damaging techniques of extraction and delivery. These techniques often result in environmental devastation and costly clean up measures. In certain circumstances the long term effects of the processes involved in extraction are understudied, misrepresented and even covered up to favor the extraction of fossil fuel energy.

With ever growing attention to environmental stewardship and contributions from the academic world, government agencies and the private sector there has been an increasing demand to supply alternatives to fossil fuel derived energy[6]. Early attempts in exploring scalable environmentally friendly energy such as first generation food based feedstocks for biologically derived energy (Bioenergy) have their proven flaws.

Using renewable feedstocks (such as Soy for Biodiesel and Corn for Bioethanol) these programs are supplementing our fossil fuel demands as well as providing a secure nationally based supply of energy. The unfortunate downside to using these feedstocks for biofuels are the inflating of food prices world wide and the increase of agricultural run off as the demand for terrestrial crops for both food and fuel increases. In certain circumstances this inflation can cause the price of feedstocks for biofuel production to sharply increase past the point of economic viability.

Second generation non food based feedstocks (such as switchgrass and jathropa) have remedied some of the flaws in first generation food based feedstocks but have proven to be less sustainable as desired due to the large demand of arable land and water required. This negative attribute is shared with first and second generation feedstocks. Recently the emergence of third generation feedstocks for bioenergy (such as algae) which do not artificially affect food prices, do not require arable land or even require fresh water, have provided great promise to the bioenergy market; specifically the biofuels sector. Algae and other third generation feedstocks have helped to continue the research and development of renewable, sustainable and environmentally friendly sources of energy as a replacement for fossil fuels.

Algae has suffered from some technological and economic barriers is the past and

---

[3] Walsh, Brian "*Ocean Acidification will make Climate Change Worse*" http://science.time.com/2013/08/26/ocean-acidification-will-make-climate-change-worse/ ©26 Aug 2013 Web 28 Aug 2013

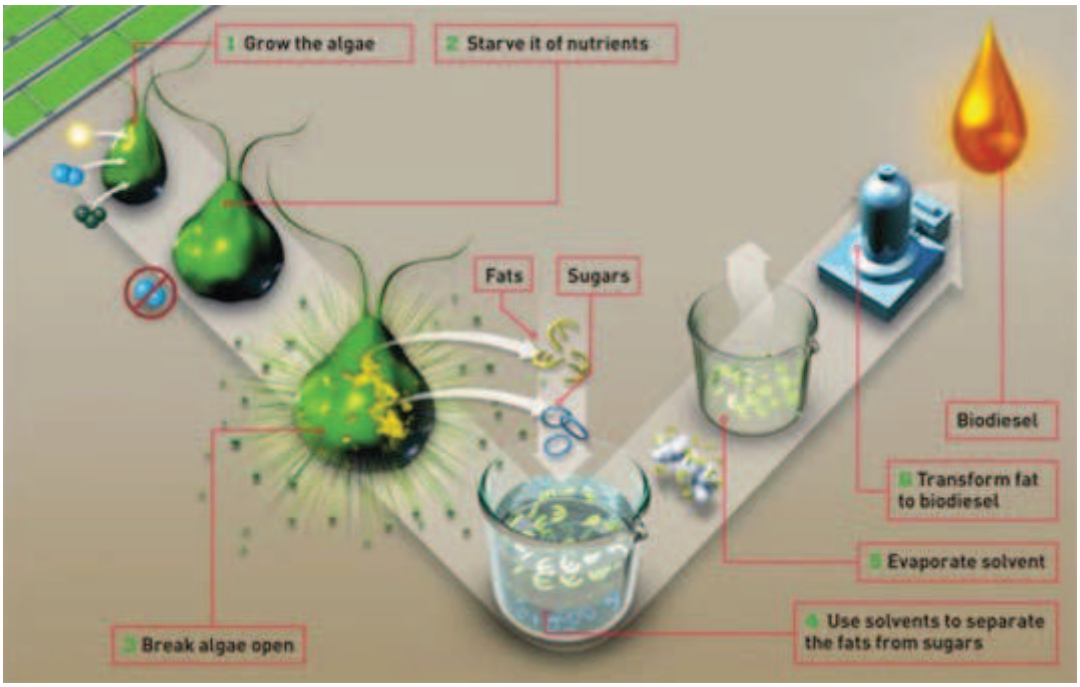
[4] Rockwell, Lilly "*A Rising Concern: The impact of sea level rise on Florida*" http://www.floridatrend.com/article/15814/a-rising-concern ©8 Jul 2013 Web 28 August 2013

[5] "*Monroe County, Florida Energy Efficiency and Conservation Strategy*" http://fl-monroecounty.civicplus.com/DocumentCenter/View/4041 ©29 Nov 2011 Web 22 Aug 2013

[6] US Department of State "*Fourth Climate Action Report to the UN Framework Convention on Climate Change:* Projected Greenhouse Gas Emissions" ©2007

advancements in PBR design, algal selection and even algal manipulation have helped overcome a growing majority of these issues. Let's briefly review the industry standard for extracting oil from algae.

Separating algae and water is energy intensive (pumping and centrifuging) or labor intensive (gravity separation and hand filtering). A vast majority of microalgae species contain 5%-75% or more (dry weight) lipid content (high grade vegetable oil/triglycerides) inside the cell wall. To harvest these lipids you have to first separate the algae from the water then lyse (break open) the cell wall killing the algae. From a slurry of biomass, water, starches and lipids you must extract the algae oil with dangerous solvents such as hexane (a carcinogen which is readily absorbed through the skin and burns with an invisible flame) or, again, energy intensive centrifuging. After all this processing you are left with lipids (triglycerides) that can only be processed into biodiesel through transesterification. (See 1.1)



(1.1)[7]

KWA has selected the algae Botryococcus braunii (Bb) as one of its initial research and development efforts. Bb eliminates these costly, labor and/or energy intensive processes by growing its oils (Botryococcenes) on the outside of the cell wall keeping the cell intact during oil harvesting and eliminating the need for dangerous solvents. After the oil harvest the Bb can be returned to the growing process to produce harvest after harvest versus the traditional route of beginning a new crop after each harvest. Bb can quickly establish a continuous cycle of pollutants (CO2, N-P-K) in, Botryococcenes out. The process in which KWA intends to harvest and collect Bb oil is technically feasible and will require further R&D to develop a functional prototype.

Bb produces Botryococcenes (triterpenes) which differ from other algal oils such as

[7] Ribbens, Dierdre."Algae SARS and Talking Whales: Science News"
http://bcmbnews.com/2012/11/02/algaesarsandtalkingwhalessciencenews/
©2 Nov. 2012 Web 17 Aug.2013

triglycerides (Omega-3 fatty acids). Published studies and research have determined that Bb is capable of producing long chain hydrocarbons which produce high octane fuels when hydrocracked in todays conventional refineries[8]. Bb accounts for much of the crude oil deposits we pump out of the ground today in places like the Middle East and the North Sea. Bb is also responsible for much of the Torbanite Coal (Boghead Coal) found in places like Pennsylvania, Scotland and Australia. Over time and through extreme pressure tons and tons of biomass were compressed resulting in coal, crude oil and even natural gases from the decomposition of the algal biomass.

One of the many beneficial attributes of KWA's project proposal is the carbon neutrality of algae as a biofuel feedstock. The algae sequester CO2 from the air or a source point polluter (such as fossil fuel fired power plants, concrete manufacturers and even breweries and distilleries) and releases that same carbon when it is burned as a fuel. This does not introduce new carbon into the atmosphere like conventional fuel sources do the carbon is simply recycled by the algae. Further benefits include the absorption of excess nutrients from polluted waters relieving the symptoms of and, in the case of agricultural waste, reducing the root cause itself.

KWA's project proposal will positively impact the Florida Keys, the Gulf of Mexico and its residents. The impact of the proposal will be measured by the reduction in the amount of GHG's present in the atmosphere, the reduction of the amount of excess nutrients in the waters and their negative effects on the ecology and by providing a renewable, sustainable, environmentally responsible source of biofuels and other high value downstream products right here in the Florida Keys.

When the project is completed Key West and KWA will be on the cutting edge of environmental stewardship and ahead of the curve in algae R&D. KWA will have established a one of a kind Keys wide source point sequestering network of algaculture facilities. KWA will provide services propelling the restoration and protection of natural resources such as air, water and American based energy while restoring the ecosystems of the Florida keys and the gulf region. KWA's project proposal will mitigate the damage to fish, wildlife and natural resources while reducing the damages from such events as eutrophic water conditions, hypoxia, fuel spills and chemical accidents.

KWA anticipates working in conjunction with the United States Navy (and other government entities) as a local resource to help develop and produce government mandated biofuels for the Navy's energy needs by 2020. These biofuel mandates can be reached using current technologies and with R&D invested towards more efficient PBR designs and alga species manipulation (both environmentally and genetically) the cost of commercial scale production will drastically decrease.

KWA's goals will include full and part time jobs based both in the growing R&D laboratory as well as the developing algaculture facilities KWA intends to bring online throughout the Florida Keys. These algaculture facilities will be implemented to target source point polluters such as sewage treatment plants and concrete manufacturing. Further algaculture facilities will be tailored in collaborative projects between KWA and entities such as Waste Management, Keys Energy and other potential clients who seek reduction of or are mandated to reduce their carbon footprint. KWA intends to employ a workforce to monitor waters, collect data and assess environmental issues and concerns and to act on them accordingly. KWA will also have the capacity to mitigate environmental emergencies such as fuel spills, solid and municipal waste accidents and other potentially hazardous and harmful eco-situations.

---

[8] Qin, Jian "*Bio-Hydrocarbons from Algae: Impacts of temperature, light and salinity*". Australian Government, Rural Industries Research and Development Corporation ©2005

As KWA continues to grow into a viable Algae research facility it will focus on production of high value downstream products produced by algae for revenue streams. KWA will pursue additional revenue streams including carbon sequestration, water remediation and algae culture sales. KWA will also bring online a prototype algaculture facility capable of supplying refineries with a renewable, sustainable, environmentally responsible feedstock for biofuel production. This facility would also contain KWA's biofuel research facility which would be supplied with algae feedstock from KWA's Keys wide network of algaculture facilities. This pilot scale facility will create additional salaried jobs as well as full and part time hourly wage jobs. KWA anticipates this pilot facility to scale up towards a fully commercial biofuel and biochemical facility which is carbon neutral, non polluting and designed with a noninvasive footprint as to not disrupt the sensitive ecology of the Florida Keys.

Proceeding are accredited cited sources which support the basis of KWA's project proposal. Please see application question 18 for a complete list of resources used to prepare this proposal.

> "*From 1978 to 1996, the U.S. Department of Energy's Office of Fuels Development funded a program to develop renewable transportation fuels from algae. The main focus of the program, know as the Aquatic Species Program (or ASP) was the production of biodiesel from high lipid-content algae grown in ponds, utilizing waste CO2 from coal fired power plants. Over the almost two decades of this program, tremendous advances were made in the science of manipulating the metabolism of algae and the engineering of microalgae algae production systems*."[9]

> "*The natural beauty and warm and sunny climate of Monroe County makes it one of the most appealing places to work, reside or visit, the latter of which is an essential part of the County's economy. However, due to its geographic location, the County is particularly vulnerable to the effects of anthropogenic global warming and resultant climate change specifically sea level rise and increasing numbers of high-energy hurricanes." ...*
>
> *"The County (Monroe County, Fl) has an acute need to respond to this issue, as its unique geographic setting makes it vulnerable to the impacts of climate change such as sea level rise and high-energy hurricanes. The natural beauty and varied habitats of the County are highly valued by its residents and tourists from across the globe, the latter of which drives a significant portion of the local economy. The County can lead by example, save money and protect and preserve what makes it so unique by doing its part to mitigate global warming and climate change." ...*
>
> "*The Sustainable Vision Statement serves as a qualitative sustainability strategy for the County (Monroe County, Fl), outlining areas that need improvement as well as opportunities for strategic development. This statement serves as the foundation for future planning and to aid in the development of the County's CAP. Covering a broad number of topics related to County and community sustainability, the Sustainable Vision Statement suggests the following actions directly related to the reduction of energy*

[9] "*A look back at the U.S. Department of Energy's Aquatic Species Program: Biodiesel from Algae"* National Renewable Energy Laboratory (NREL/TP-580-24190) July 1998

consumption:

- *Reduce GHG emissions by updating building energy codes, promoting green construction practices, and incentivizing renewable energy installation and purchase*
- *Support the development of renewable energy technologies within the County by establishing a renewable portfolio standard, lowering the barrier to entry for the purchase of renewable technologies, as well as supporting local renewable research*."[10]

"*Continued use of petroleum sourced fuels is now widely recognized as unsustainable because of depleting supplies and the contribution of these fuels to the accumulation of carbon dioxide in the environment. Renewable, carbon neutral, transport fuels are necessary for environmental and economic sustainability. Biodiesel derived from oil crops is a potential renewable and carbon neutral alternative to petroleum fuels. Unfortunately, biodiesel from oil crops, waste cooking oil and animal fat cannot realistically satisfy even a small fraction of the existing demand for transport fuels. As demonstrated here, microalgae appear to be the only source of renewable biodiesel that is capable of meeting the global demand for transport fuels. Like plants, microalgae use sunlight to produce oils but they do so more efficiently than crop plants. Oil productivity of many microalgae greatly exceeds the oil productivity of the best producing oil crops. Approaches for making microalgal biodiesel economically competitive with petrodiesel are discussed*."[11]

"*Shell plans to spend $100 billion from 2011-2014 to support new energy production. We are entering more challenging environments to unlock new resources and boosting production from existing fields. At the same time, we are using new technologies and an innovative approach to limit our impact on the environment and find effective ways to engage with communities near to our operations...*

"We believe the most practical, commercially viable way to reduce Co2 from transport fuels over the next 20 years will be lower-carbon biofuels. Already one of the largest suppliers of biofuels, we have moved into biofuel production."[12]

"*Chevron believes that advanced biofuels could help meet the world's future energy needs if they are scalable, commercial and affordable for consumers. That's why we are working on developing solutions in the following areas:*

- ***Scalability*** *– Given the global demand for energy, biofuels manufacturers would need tens of millions of tons of biomass annually to produce enough fuel to make*

---

[10] "*Monroe County, Florida Energy Efficiency and Conservation Strategy*" http://fl-monroecounty.civicplus.com/DocumentCenter/View/4041 ©29 Nov 2011 Web 17 Aug 2013

[11] Chisti, Yusuf "*Biodiesel from microalgae*" Biotechnol Adv. May-Jun;25(3):294-306 ©13 Feb 2007.Web 17 Aug. 2013

[12] "*Shaping the energy future through innovation*" Website http://www.shell.com/global/future-energy/shaping-future.html ©2013 Web 18 Aug 2013

a difference. Chevron is evaluating a variety of technologies for manufacturing biofuels. Finding the best option is time-consuming because technology that works in the laboratory often cannot be successfully scaled to economic commercial production.

- ***Sustainability*** *– As a society, we must understand the environmental and socioeconomic issues of land and biomass use, from the effects of growing and harvesting biomass to the production and use of biofuels.*
- ***Cost*** *– Biofuels manufacturers will need to drive down the costs of cultivating, harvesting and transporting biomass, and must find ways to make large-scale production economical. To enable rapid market acceptance, advanced biofuels must be compatible with existing infrastructure and vehicles and must meet consumer expectations.*
- ***Policy*** *– Policymakers must set realistic goals that establish a level playing field so there is enough time for technology to advance and for the marketplace to choose winners and losers.*"[13]

"*Botryococcus braunii is a colonial green alga that is found in lakes and reservoirs in Australia and in other parts of the world. Blooms of this alga resemble a large floating mat on the water surface. This alga contains hydrocarbon up to 75% of dry weight, which can be converted into petrol, diesel or turbine fuel or other liquid or gaseous hydrocarbons. Given … (resources like) brackish water and high average radiant energy influx (Sunlight), there is a great potential to develop a source of biofuel production through cultivation of microalgae.*"[14]

"*Many kinds of photobioreactors are available for culturing microalgae ... and most of these have been evaluated for B. braunii culture. Batch and continuous schemes of operation have been tested in open and closed (axenic) bioreactors. Because of economics, only continuous culture is realistically feasible for the large-scale production of microalgal biomass. A commercially viable continuous culture process needs to attain a high density of biomass...*"[15]

"Scientists have described technology that accelerates microalgae's ability to produce many different types of renewable oils for fuels, chemicals, foods and personal-care products within days using standard industrial fermentation. ...

"... microalgae are the original oil producers on earth, and that all of the oil-producing machinery present in higher plants resides within these single-cell

---

[13] "*Biofuels: Turning trash into treasure*" Website http://www.chevron.com/deliveringenergy/biofuels/?utm_campaign=US_Energy_Sources_-_Biofuels&utm_medium=cpc&utm_source=google&utm_term=biodiesel&utm_content=sl7BIriyl_dc|pcrid|19965582409|pkw|biodiesel|pmt|b ©2013 Web 18 Aug 2013

[14] Qin, Jian "*Bio-Hydrocarbons from Algae: Impacts of temperature, light and salinity*". Australian Government, Rural Industries Research and Development Corporation ©2005.

[15] Banerjee, Sharma, Rohit, Yusuf and Banerjee "*Botryococcus braunii: A renewable source of Hydrocarbons and other chemicals*" Critical Reviews in Biotechnology, Vol 22 No 3 pp 245-279 ©2002.

organisms. …"[16]

"As the largest fuel consumer in the United States – using some 90 percent of the energy used by the federal government – the military has been ramping up plans to diversify its fuel options in the name of both economics and security, particularly following a related announcement by President Barack Obama in 2010. A major part of this push has been a focus on research into new alternative fuels, particularly through investing and partnering with the private sector...

"*Since 2009, much of the military's biofuels vision has been spearheaded by the U.S. Navy. In turn, this has been pushed particularly by Navy Secretary Ray Mabus, who recently wrote that "if the Navy can fully pursue its initiatives, (advanced biofuel) will reach cost-competitiveness in 2016. …*

"While concern has mounted around the world in recent years over 'Western countries' new appetite for biofuels impacting negatively on world food prices and availability, the current U.S. military push is focusing almost exclusively on non-food items, including algae and oils made from non-food and agricultural wastes, with plans to use trash at some point."[17]

"*Admittedly, the military is facing a tough budgetary environment, and across the board sequestration cuts mean that virtually every area of the military has been harmed. These cuts are already harming readiness, undermining the acquisition and training process, and are slashing much-needed research and development. However, even in the face of such cuts, an investment in deploying advanced biofuels is important*."[18]

"*Help us to lead a Green Revolution, developing new sources of clean energy that will power our economy and preserve our planet*."[19]

8. Budget Narrative/ Financial Feasibility/ Cost-Effectiveness:

KWA anticipates establishing itself as a limited liability company and conducting business as such. $25,000 will be budgeted towards site locating, securing and developing of a fully operational algaculture laboratory. This seed financing phase will also include costs incurred from the creation of KWA including the estimated cost of planning, design and permitting. Gopal V. Jayanthi (Founder/President of Susquehanna Biotech, llc) has pledged algaculture equipment and algae inoculant "in kind match" valued at $5,000. This number was calculated based on previous knowledge and experience. The remaining $20,000 of seed financing plus the 3% administrative fees would be financed through RESTORE Act funds. In total KWA is requesting $496,500 which is estimated to be greater

---

[16] American Chemical Society (ACS). "*Microalgae produce more oil faster for energy, food or products*." ScienceDaily ©7 Apr. 2013 Web. 17 Aug. 2013.

[17] Biron, Carey L. "*Funding restored for U.S. Military Biofuels Programme*" Inter Press Service (IPS) ©19 Dec. 2012 Web 17 August 2013.

[18] Holland, Andrew. "*Why the US Military should continue biofuel research*" Christian Science Monitor 9 May 2013 Web 17 August 2013.

[19] Obama, Barack; President of the United States. "*Arizona State University (ASU) commencement speech*" 13 May 2009.

than 98% of the project proposals estimated cost of $505,000.

Once KWA moves into the startup phase of its project proposal it is anticipated that 3-5 new jobs will be created within the lab itself. The estimated cost of interviewing, hiring and payroll for these newly created positions is $125,000. These employees would commence the day to day operations of the algaculture laboratory and oversee the purchasing, installation and usage of additional lab equipment and supplies valued at $100,000. In addition to the propagation of algal species the employees would also oversee a research and development budget of $30,000 to design and streamline a prototype PBR for use in bulk algaculture growth; IE around 100 liters. These expenses are anticipated to be met with 100% RESTORE Act funding.

Over the course of KWA's first year of operation it estimates that the cost of the algaculture facility, including marketing and rent, to be an additional $75,000. KWA again anticipates RESTORE Act funding to cover 100% of these costs. Over the course of the first year of operation KWA anticipates to hire 2-3 additional employees, at an estimated cost of $75,000, to meet the growing demands of the laboratory. In addition to KWA employees KWA will facilitate the use of industry consultants for various aspects of its overall business plan. The estimated cost of outside consulting fees for the first year is $70,000 of which Susquehanna Biotech has pledged an additional $3,500 (350 hours) of "in kind" match. Technical expertise in general lab procedures, species specifications, species manipulations, PBR design and extraction and harvesting will aid in generating revenue streams in addition to the end goal; bioenergy.

While the algaculture activities of KWA thrive KWA will pursue further funding in the form of government grants, venture capital and Small Business Administration (SBA) sponsored resources. A percentage of RESTORE Act funding could be applied as "cash match" in future funding applications. RESTORE Act funded purchases would be assessed as "in kind" contributions in efforts to secure future funding as well.

KWA's project proposal will initially rely on the awarding of grants and private funding to obtain financial feasibility. Over the course of KWA's development revenue streams will offset the need for outside financial contributions. These targeted revenue streams such as high value byproducts and remediation contracts along with the production of bioenergy and biomass will position KWA as a leader in renewable, sustainable environmentally friendly products. As money being spent to achieve primary goals develops into revenue being earned accomplishing these and future goals the cost effectiveness of KWA will be evident. The protection of natural resources, mitigation of environmental disasters and the reduction of air and water pollutants while producing tangible, marketable goods will prove to be both economical and restorative for Key West, the Florida Keys and the entire Gulf of Mexico region.

9. Technical Feasibility:

KWA is prepared to enter the seed financing stage of a startup business. With initial funding KWA can locate the appropriate facility to establish the Algae Culture and Research and Development laboratory. Once the laboratory has been designed and installed KWA will commence the growing of algae with market ready and proven culture lab techniques and protocol. The hiring of the appropriate biologists and initial workforce will begin the startup phase for KWA's project proposal.

The success of KWA's project proposal will be built on the platform of renewable, sustainable and environmentally responsible energy. Each phase of the project will build upon developing product

streams and increasing the cost effectiveness of producing these streams building revenue and attracting investments. As algae for bioenergy technology advances and continues to reduce production costs the feasibility of the project will grow into the commercialization of the project.

KWA's project proposal is feasible using todays technology. The top 15 companies, which represent the majority of the stake in this emerging market, have made advances in the field which represent the most promising paths to commercial realization. Proceeding is an abstract of a web published article of the top technological advances by some of those companies and the use of their technologies.

> "***Solazyme:*** *One of the leaders in the algae fuel industry, seven-year-old Solazyme has amassed more than $125 million in funding from high profile investors like oil company Chevron's VC arm, investors Morgan Stanley, Virgin Group's Richard Branson, and personal goods product producer Unilever. I toured the factory last year (*2009*), and while the company isn't producing commercial-scale algae fuel just yet, it's currently selling its algae oil for applications like food (yum, algae milk) and products like lotions. Solazyme wants to commercialize its fuel technology in the 2012-2013 time frame, with a production cost target of $60 to $80 per barrel. To get there, it will have to build a commercial-scale algae plant, which can cost over $100 million. ...*
>
> "***Synthetic Genomics:*** *Synthetic Genomics — the brainchild of genomics guru Craig Venter — has scored the largest deal with an oil company of all of its competitors: a $600 million partnership with Exxon Mobil. As we put it last year (*2009*), the deal was so big for the nascent algae fuel industry, it was basically algaes's big break. Synthetics Genomics and Exxon opened an algae test facility at Synthetic Genomic's HQ in La Jolla, Calif. in June (*2010*). The greenhouse facility is the first step in figuring out if Synthetic Genomic's algae fuel can move beyond the lab environment and be produced economically at a larger scale. The next step will be an outdoor facility that the partners will build by 2011. ...*
>
> ***PetroAlgae:*** *PetroAlgae currently trades on the trades on the OTC Bulletin Board under the symbol PALG, but in August (*2010*) filed an S-1 for an IPO. PetroAlgae describes its technology as a development of light and environmental management systems that enable algae to grow at four times its natural growth rates. The company says its "secret sauce" is in its software, which can manage algae harvesting density and sunlight exposure, as well as its remote sensing system that can measure the algae crop density. ...*
>
> ***Sapphire Energy:*** *Sapphire is another algae fuel heavyweight that hadn't yet come onto our radar at the time of our original list* (2008). *Founded in 2007, Sapphire Energy plans to ramp up its production to 1 million gallons of algae-based diesel and jet fuel per year by 2011. By 2018, Sapphire says it will crank out up to 100 million gallons per year, and by 2025, the company says that number will soar to 1 billion gallons per year, which would be about 3 percent of the U.S. renewable fuel standard. So yep, those are some big claims. Sapphire has raised more than $100 million from the likes of Bill Gates' investment firm Cascade Investment, as well as ARCH Venture Partners, Wellcome Trust and Venrock, and so far it has tested its fuel with two commercial*

airlines Continental and JAL.

Bioalgene: *Outta Seattle University, Bioalgene is trying to speed up the process of algae production to an 8-day cycle. The company says three outdoor field tests in 2008 with Washington State University have proven its concepts, and Bioalgene plans to build pilot plant sites in Eastern Washington.*

Phycal: *Phycal came onto my radar when it won a $24.2 million federal research grant for its algae fuel technology. It's parent company is Logos Energy, and its based in Highland Heights, OH. ...*

"***Solix Biofuels:*** *Solix says its technology is able to be massively scaled, which at the end of the day is the secret that will unlock algae fuel. Specifically Solix describes its technology as proprietary photobioreactors that are ten times more productive than open pond systems. Partners include Valero, Los Alamos National Labs, Colorado State University, and Shanghai Alliance Investment.*

Aquaflow: *The New Zealand company's goal is to become "the first company in the world to economically produce biofuel from wild algae harvested from open-air environments." The company is unusual in that it harvests algae from polluted waters and produces biofuels from that harvested algae. So revenue streams can be cleaning up water, and producing biofuels. The company has partnered with Honeywell's UOP. ...*

"***Seambiotic:*** *Seambiotic says it's "the first company in the world that is utilizing flue gas from coal burning power stations for algae cultivation." The company is seven-years-old* (2010*) and is based in Israel.*

Bodega Algae: *Like several of its competitors Bodega Algae uses closed bioreactors instead of open ponds to grow algae. But the company's reactors are scalable and stackable, and are meant to be placed next to industrial and municipal waste streams to harvest the algae. Bodega has its roots out of MIT.*

Algenol: *Algenol says it grows hybrid algae to produce ethanol, and has assembled one of the largest collections of blue-green algae strains in the world. To date* (2010)*, the company says it has raised $70 million and it plans to build a pilot-scale biorefinery, and a 100 million to 1 billion gallon of ethanol per year refinery. Algenol says it has partnered with Dow Chemical and Valero and has received a $25 million grant from the DOE. ...*"[20]

KWA's Founder, James Henderson, was a founding member of Susquehanna Biotech (SBT) based in Mechanicsburg, Pa. During Mr. Henderson's time from March 2007 through June 2009 with SBT he and Founder/President Gopal V. Jayanthi established a viable alga culture lab. The lab was originally scaled up from a few liters of algae culture to several hundreds of gallons in various PBR's.

The Department of Energy (DOE) funded a collaborative project from the mid 1970's through the mid 1990's known as the Aquatic Species Program (ASP). This project, it's innovations, it's demonstrations and proven production capabilities are the foundation of the continued private sector development of algal species for bioenergy.[21] The DOE has recently funded projects working on the

[20] Fehrenbacher, Katie "*15 Algae startups, 2010 edition*" Web http://gigaom.com/2010/10/17/15-algae-fuel-startups-2010-edition/

[21] US Department of Energy *"A look back at the U.S. Department of Energy's Aquatic Species Program:*

commercialization of algae oil for transportation fuels and algae biomass for fuel cell technologies and bioethanol production.[22]

> "*Algae production for use in fuels shows great promise. As a feedstock, algae can be shown to replicate very quickly and in environments that do not require additional resources, but make use of by-products of current industry. It is therefore thought to be an ideal feedstock for the future creation of bio-diesel, bio-gasoline and bio jet fuel…*"[23]

> "*... Microalgal biodiesel is technically feasible. It is the only renewable biodiesel that can potentially completely displace liquid fuels derived from petroleum. Economics of producing microalgal biodiesel need to improve substantially to make it competitive with petrodiesel, but the level of improvement necessary appears to be attainable.*
>
> *Producing low-cost microalgal biodiesel requires primarily improvements to algal biology through genetic and metabolic engineering. Use of the biorefinery concept and advances in photobioreactor engineering will further lower the cost of production. In view of their much greater productivity than raceways, tubular photobioreactors are likely to be used in producing much of the microalgal biomass required for making biodiesel. Photobioreactors provide a controlled environment that can be tailored to the specific demands of highly productive microalgae to attain a consistently good annual yield of oil*."[24]

10. Readiness for Implementation/Permitting Considerations:

KWA has yet to design the exact layout of it's intended algaculture laboratory but has selected and priced, with manufacturers, the necessary equipment and lab supplies required to suit the needs of KWA's project proposal. SBT has dedicated to the proposal primary lab equipment as in-kind match seed financing along with another in-kind match of one years technical consultation once the startup phase has commenced. Dependant on final approval by yet to be sought after authority's at the Federal, State, County and local levels KWA could be up and running in a matter of weeks from the start of seed financing. With guaranteed startup financing the algaculture lab will expand to include a R&D department within the first 6-12 months.

As KWA's lab propagates inoculation strength algal cultures sales of these cultures will commence. As these algal cultures increase in volume KWA will be able to bring online PBR's (with volumes of several hundred to several thousand liters and more) increasing sales potential along with readiness for algaculture remediation site construction projects slated for years 2 and 3 of operation. The full scope of KWA's 1-3 year plan could be streamlined and fast tracked with a larger than anticipated staff and financing opportunities such as government grants and private investments.

Biodiesel from Algae" National Renewable Energy Laboratory (NREL/TP-580-24190) ©July 1998

[22] Fehrenbacher, Katie "*15 Algae startups, 2010 edition*" Web http://gigaom.com/2010/10/17/15-algae-fuel-startups-2010-edition/

[23] United Nations: Food and Agriculture Organization http://www.fao.org/home/en/

[24] Chisti, Yusuf "*Biodiesel from Microalgae*" Biology Advances 25 pp 294-306 ©2007

11. Project Completion Timetable:

The initial step during seed financing of the project is to establish Key West Algae, LLC (KWA) and appoint James D. Henderson (Founder) acting CEO/President. The assistance of a certified public account (CPA) and business lawyer will be facilitated.

The newly formed KWA will then search out locations in Key West which would be suitable for establishing a professional algae culture laboratory. KWA anticipates hiring it's first employees at the lab and providing algae cultures of 25ml-100ml within 6-12 months of initial funding. During this time frame KWA will seek additional funding using a percentage of awarded Restore Act funds as "Cash Match" and Restore Act funds purchased equipment as "In Kind Contribution".

Also within the first 12 months of operation KWA anticipates the sequestration (and subsequent logged values) of Co2 and N-P-K to begin mitigating damage to the atmosphere and the water which is vital to our economy here in the Florida Keys. Such data will be compiled from KWA's laboratory and from mobile or temporary PBRs remediating effluent from Co2 generating commercial applications such as propane fueled food concessioners at street festivals and concrete manufacturing. These collaborations will be sought after as both revenue streams and avenues for grant funding and private investing.

Months 12-18 will see the implementing of KWA's source point PBR protocol and the R&D into automated continuous flow systems. Continuous flow meaning a constant stream of influent in and highly valued algae biomass out. These supplies of algae biomass will be the basis of expanding our R&D lab to start identifying high value manufacturable products to generate revenue.

Also in the 12-18 month range KWA will begin the collection of Botryococcenes (all applicable permits necessary will be sought after and obtained as required by law) to increase the scope of our R&D department as we investigate the natural triggers of algal oil production. Continued installation and monitoring of KWA's Keys wide network of PBR's as well as the collection of algal biomass will increase KWA's revenue as we begin offering high value downstream products to the marketplace. With the broadening of KWAs scope and facilities will naturally come the creation of jobs, both salaried as well as full and part time hourly wage positions.

Within months 18-24 of KWA's project proposal we anticipate the development of a prototype algaculture system with the volume of 1000 gallons (about 4000 liters). This PBR design will be optimized for maximum algal biomass production and complete data acquisition. KWA intends to scale up a refined prototype PBR within the 24-36 month time frame. KWA anticipates the growing demand for biofuels to begin generating income through biofuel based fuel additives in months 24-36 as well. Additional grants and private investments will be sought as required and we anticipate the regulation of carbon, nitrates and phosphates to further generate revenue for KWA through credits which will be tradeable on a market now currently in its infancy.

KWA's 3-5 year plan entails retrofitting a commercial fuel tanker to house PBR systems on the deck surface of the vessel and storing onboard processed algae oils in the holding tanks. The vessel would be deployed in the gulf capable of remediating offshore waters and return to port to unload its harvest of renewable, sustainable and environmentally friendly energy at a biofuel processing facility..

12. Environmental Benefits:

Algae for biofuels is a carbon neutral, renewable, sustainable source of energy. Algae naturally sequester Co2 and excess nutrients from the environment around them reducing pollution in both the air

we breathe and the water we use. In the Keys this is not limited to merely drinking water but to the waters we boat, dive, fish and play in; a vital link to the tourist industry in the Keys. With cleaner waters come less eutrophic conditions, hypoxia and less frequent Harmful Algal Blooms (HAB).

HABs occur in the Gulf of Mexico as a result of naturally occurring algae being fed an unnaturally occurring amount of nutrients; Nitrates, Phosphates and Salts (N-P-K). These excess nutrients are introduced into the Gulf by rivers (like the Mississippi) whose watersheds encompass vast areas of American farmland (both terrestrial crops and livestock) which are source point pollutants of agricultural runoff (N-P-K). The nutrient rich (eutrophic) waters are also polluted by industrial locations (such as factories, chemical plants and refineries) as well as city and municipal infrastructure (including sewage treatment plants and road surface/parking lot runoff) both upstream and on the shores of the Gulf itself.

The N-P-K are absorbed by algae already present in the water body along with CO2 from the atmosphere and sunlight triggering a mass population growth also known as a bloom. These blooms differ from the phenomenon known as “red tides” (Kareni Brevis algae in the Gulf) which are attributed to seasonal and conditional elements versus just the mere presence of excess N-P-K, water, sunlight, Co2 and wild algae.

As the bloom grows the alga block out increasing amounts of sunlight vital to beneficial aquatic plants below the surface of the water. These plants produce oxygen needed for various fish, shellfish and other aquatic life present in the water. As the HAB increases in size the plant and marine life begin to suffer from Hypoxia. Hypoxia is the depletion of diffused oxygen in water. Diffused oxygen in water is vital for marine life survival. Hypoxia is responsible for large fish kills, were schools of fish swim into oxygen depleted waters and die.

By growing beneficial alga species on shore in enclosed PBRs, open ponds (or hybrid versions of both) KWA can help combat these HAB’s by reducing the amount of excess nutrients available to wild algae. Additional benefits to the environment resulting from the growth of algae for biofuels include the reduction of GHG, specifically Co2, emissions. This reduction of GHGs will lessen the impact of climate change worldwide reducing the risks associated with it.

13. Economic Benefits:

KWA’s project proposal introduces several dynamic revenue streams beginning in the startup phase of operations including cultured algae samples, inoculations and algae growth medium. There are a very limited number of suppliers for such product especially in mass quantities over 1 liter in volume. KWA will source its initial species of algae to propagate from the leading algal culture collection in the world at UTEX The culture collection of algae at the University of Texas at Austin. This will ensure the highest quality algae available as well as bringing the most desired products to market in a yet to be seen scale.

As the project reaches set goals while completing the seed financing and startup phases KWA will pursue contracts for carbon sequestration and implement new jobs both in the R&D lab as well as the commercial aspect of algae sales, marketing and promotion. KWA will have a face in the community demonstrating, through collaborative projects, how simply algae can grow in the year round weather of the Florida Keys. KWA will also demonstrate how algae naturally absorb Co2 and nutrients from the environment they live and produce oxygen as well as remediate water and air. These prototype collaborations will involve capturing Co2 from the source (IE a diesel powered generator, effluent from

propane cooking such as deep fryers and grilles) while also generating press and community knowledge of KWA and it's projects by implementing them at high profile annual events throughout the Keys such as Gumbay/Fantasyfest, New Years and other events including concerts and street festivals.

As the project progresses towards bringing a Keys wide network of algaculture sites online KWA will create new jobs in the workforce through the construction, upkeep and monitoring of sites. These jobs would be salaried requiring college degrees and/or relative experience and technician positions earning an hourly rate. These sites, which will create new jobs, will also bring in new revenue through remediation contracts and increase in volume of available high value downstream algal products for KWA.

Within 3-5 years KWA plans to construct a scalable prototype PBR (based on real world usage and data) which is fully automated and self contained capable of tracking its daily intake of Co2 and N-P-K. These PBR's will be fine tuned to site specifications and designed to adequately handle the required remediation parameters. With several sites producing algae for biofuels KWA R&D laboratory will expand to biofuel processing efforts as well as specialty biochemicals, bioplastics, nutraceuticals and pharmaceutical components and other high value products. This expansion will bring with it new job creation as well, full and part time job creation is anticipated in the lab along with college internship positions to be developed.

KWA anticipates working with government and private entities to secure revenue streams as well as grants and venture capital associated with the emerging bioenergy market. KWA also anticipates the local and global demand for conventional and renewable energy will increase steadily for decades to come bringing along new challenges and technologies to face those challenges. KWA also believes that algae will be a vital feedstock for biofuel production and will help mitigate damages caused by the extraction and consumption of fossil fuels. With each milestone achieved by KWA we anticipate job creation, additional revenue streams and a greater presence in the marketplace of renewable energy.

14.Community Economic and/or Environmental Resilience Benefits:

KWA's project proposal is designed to assist in the prevention and mitigation of environmental damages suffered by the marine and terrestrial life of Key West and the Florida Keys. These damages could be the result of GHG emissions, eutrophic water, hypoxia, chemical and petroleum spills or even boating accidents. These preventive and reactive measures will lessen the impact of events, natural or otherwise, and reduce the overall financial burden of the clean up.

KWA intends to develop, through additional grant work if applicable, a prototype biofuel production facility which would process algae biomass into algae bioenergy, specifically fuels derived from algal oils (Aviation kerosene, Gasoline) and residual algae (Ethanol).[25] This facility would be the central hub of activity for a Keys wide network of remediation sites producing algae. The facility will be designed to meet and exceed the building code tolerances towards hurricanes and storm surges. This tolerance will help maintain the operation of the facility through the toughest of events insuring a local supply of energy to the Florida Keys in the event that outside sources are undeliverable.

15.Complements to Existing Efforts/ Public Acceptance:

[25] US Department of Energy *"A look back at the U.S. Department of Energy's Aquatic Species Program: Biodiesel from Algae"* National Renewable Energy Laboratory (NREL/TP-580-24190) ©July 1998

KWA's project proposal complements the emerging bioenergy market by providing a wholly dedicated business plan focused on renewable, sustainable and environmentally friendly energy produced from algae. Several current R&D projects involved in biofuels are managed by large conventional energy companies whose interest are spread across many potential feedstocks and technologies. With such a broad scope major advancements in any one given area will be slow to market and potentially obsolete when market ready. KWA's focus on algae for bioenergy intends to bring to market a commercial scale, end to end algae oil production facility in a timely manner. This facility would be the hub of activity for a Keys wide network of algacultural sites.

Public demand is growing for renewable sources of energy. Furthermore the American public as well as our government are demanding more and more North American sourced energy, especially in the transportation fuels market. This demand has led to massive amounts of funding for R&D projects such as the canadian oil sands extraction (bitumen) and a push to explore federally protected pristine wilderness. Unfortunately these emerging sources of energy and their extraction techniques are devastating to the ecology surrounding them and the overall environment in general.

Public demand is growing for cleaner, American made energy. As public and private funding is being directed to bioenergy and emerging bioenergy technologies federal, state and local governments are developing plans to mitigate their own contributions to air and water pollution as well as revising regulations on industries in their jurisdiction. These are signs of the movement towards eco-minded policy and planning to promote an environmentally responsible community, business sector and government. KWA's project proposal is capable of complementing and surpassing many of the Monroe County goals and milestones set forth in its November 2011 report "Energy Efficiency and Conservation Strategy"[26] concerning GHG emissions and the overall environmental footprint of Monroe County.

16. Compliance with Federal, State, Local Regulations:

KWA's project proposal will adhere to all Federal, State and Local regulations. All the necessary licenses, permits, incorporations, representations and fees will be sought and finalized during the seed financing stage of the project. When KWA begins the startup phase of the project proposal it will maintain transparency and accountability on all fronts and operate within the parameters of the law.

17. Project Management Capacity:

KWA's Founder and CEO James D. Henderson was a founding member of Susquehanna Biotech (SBT) located in Mechanicsburg, Pa and has designed and implemented algae to fuels research and development projects both in lab and greenhouse environments. SBT, with the aid of Mr. Henderson acting as Operations Manager, was assisted by or worked in conjunction with the following entities while conducting R&D. The Dickson College Organic Farm (Boiling Springs, Pa), University of Texas El Paso at Austin Algae Collection and The Murata Business Center (Carlisle, Pa). He also has worked with the Small Business Administration (SBA) in Pennsylvania and The Small Business Development Center(s) (SBDC) in Pennsylvania at Shippensburg University and Bucknell University in Lewisburg, Pa. This work was mostly comprised of business development and marketing with technical

[26] *Monroe County, Florida Energy Efficiency and Conservation Strategy*"
http://fl-monroecounty.civicplus.com/DocumentCenter/View/4041 ©29 Nov 2011

assistance provided by the universities.

James D. Henderson (CEO KWA) and Gopal V Jayanthi (President of SBT) were nominated for Technology Application of the Year during the 17th Annual Pennsylvania Technology Awards Gala in Harrisburg, Pa July 2009. The nomination came from the work SBT had underdevelopment at the Murata Business Center.

Upon the formation of and the first phase of seed financing for KWA James D. Henderson will commence day to day operations and hire the appropriate staff to implement KWA's short term strategies. This initial phase of hiring and startup will finely tune the algae culture laboratory and put in place key employees who will be fundamental in achieving KWA's short and long term goals.

18. Additional Information:

Resources

American Chemical Society (ACS) "*Microalgae produce more oil faster for energy, food or products*." ScienceDaily ©7 Apr. 2013

Anirban Banerjee,1 Rohit Sharma,1 Yusuf Chisti,2 and U. C. Banerjee1 "*Botryococcus braunii: A Renewable Source of Hydrocarbons and Other Chemicals*" Critical Reviews in Biotechnology Vol. 22 No. 3 pp. 245–279 ©2002

Asterio Sa´nchez Miro´n, Antonio Contreras Go´mez, Francisco Garcı´a Camacho, Emilio Molina Grima, Yusuf Chisti "*Comparative evaluation of compact photobioreactors for large-scale monoculture of microalgae*" Journal of Biotechnology 70 pp 249–270 ©1999

Behar, F., Derenne, S., Largeau, C. "*Closed pyrolyses of the isoprenoid algaenan of Botryococcus bruunii, L race: Geochemical implications for derived kerogens*" Geochimica et Cosmochimica Acta, Vol. 59 No. 14 pp. 2983-2997 ©1995

Biron, Carey L "*Funding restored for U.S. Military Biofuels Programme*" Inter Press Service (IPS) ©19 Dec. 2012

Cameron Cole *"Monroe County, Florida Energy Efficiency and Conservation Strategy*" http://fl-monroecounty.civicplus.com/DocumentCenter/View/4041 ©29 Nov 2011

Chevron Corporation "*Biofuels: Turning trash into treasure*" Website http://www.chevron.com/deliveringenergy/biofuels/?utm_campaign=US_Energy_Sources_-_Biofuels&utm_medium=cpc&utm_source=google&utm_term=biodiesel&utm_content=sl7BIriyl_dc|pcrid|19965582409|pkw|biodiesel|pmt|b ©2013

Chisti, Yusuf "*Biodiesel from Microalgae*" Biology Advances 25 pp 294-306 ©2007

Chisti, Yusuf "*Biodiesel from microalgae beats bioethanol*" Trends in Biotechnology Vol. 26 No. 3 pp 126-132 ©2007

Ennouali, M., Ouhssine, M., Ouhssine, K. and Elyachioui, M "*Biotransformation of algal waste by biological fermentatio*n" African Journal of Biotechnology Vol. 5 No. 13, pp 1233-1237 ©3 July 2006 Website http://www.academicjournals.org/AJB ISSN 1684–5315 ©2006 Academic Journals

Holland, Andrew "*Why the US Military should continue biofuel research*" Christian Science Monitor ©9 May 2013

Largeau, C. Casadevall, E. Berkaloff,C. and Dhamelincout, P. (1980) Phytochemistry 19

©1943
Monroe County *"Monroe County, Florida Energy Efficiency and Conservation Strategy*" http://fl-monroecounty.civicplus.com/DocumentCenter/View/4041 ©29 Nov 2011
Obama, Barack; President of the United States "*Arizona State University (ASU) commencement speech*" ©13 May 2009
Qin, Jian "*Bio-Hydrocarbons from Algae: Impacts of temperature, light and salinity*". Australian Government, Rural Industries Research and Development Corporation ©2005
Ribbens, Dierdre "*Algae SARS and Talking Whales: Science News*" Website http://bcmbnews.com/2012/11/02/algaesarsandtalkingwhalessciencenews/ ©2 Nov. 2012
Rockwell, Lilly "*A Rising Concern: The impact of sea level rise on Florida*" http://www.floridatrend.com/article/15814/a-rising-concern ©8 Jul 2013
Sawayama, Inoue, Yokoyama "*Continuous culture of hydrocarbon-rich microalga Botryococcus braunii in secondarily treated sewage*" Appl Microbiol Biotechnol 41 pp 729-731 ©1994
ScienceDirect "*Autotrophic cultivation of Botryococcus braunii for the production of hydrocarbons and exopolysaccharides in various media*" Biomass and Bioenergy 31 pp 87-93 ©2007
Shell Corporation "*Shaping the energy future through innovation*" Website http://www.shell.com/global/future-energy/shaping-future.html ©2013
S.P. Chu The Journal of Ecology Vol. 30 No. 2 pp. 284-325 ©Aug 1942
US Department of Energy *"A look back at the U.S. Department of Energy's Aquatic Species Program: Biodiesel from Algae"* National Renewable Energy Laboratory (NREL/TP-580-24190) ©July 1998
US Department of State "*Fourth Climate Action Report to the UN Framework Convention on Climate Change:* Projected Greenhouse Gas Emissions" ©2007
Walsh, Brian "*Ocean Acidification will make Climate Change Worse*" Time http://science.time.com/2013/08/26/ocean-acidification-will-make-climate-change-worse/ ©26 Aug 2013 Web 28 Aug 2013
Zollo, Luca PHD "*Algae for Biofuel: Promised Land or Mirage?*" Cargill Corporation ©27 Jan 2009

Pricing Data

(in reference to question 8)

Laboratory Needs: (Startup Phase) $100,000 (estimates based on quotes and pricing research. Estimated factors of shipping and install have been included)

- ***Algae Cultures (20 liters starter culture)***:$250 per liter UTEX culture collection $5,000 + Shipping
- ***Algae Growth Chamber*** (for 10ml-1000ml lab culture storage):Caron Products and Services Sales contact Paul Sereni Model 6341 $18,495.00 +Shipping+install

- ***Algae Medium (Chu 13 component)s***: CHU 13 medium is a culture medium used in the growth of certain algal species[27] It is used as growth medium the algae Bb[28] $5,000
- ***Algae Photobioreactors (10 kits)***: http://web.biosci.utexas.edu/utex/photobioreactor.aspx UTEX PBRs $200 for lab kit includes: One (1) Large, 2-Liter UTEX Photobioreactor and One (1) Small, 500-mL UTEX Photobioreactor $2,000 + shipping
- ***Autoclave*** (Sterilization):Panasonic Top loading autoclave MLS series 3751L $9,000
- ***Clean Bench*** (large transfer of medium, inoculant, culture): The Baker Company Edgegard Model EGBIV22 Space Saver $7,500
- ***Eye Wash/shower station***:Guardian Equipment Combo Shower Hand operated $700
- ***Glovebox*** (small batch transfer of cultures and medium):$3,500+ shipping
- ***Lab Supplies*** (Beakers, flasks, test tubes, etc) $10,000

[27] S.P. Chu (Aug., 1942) The Journal of Ecology, Vol. 30, No. 2, pp. 284-325
[28] C. Largeau, E. Casadevall, C. Berkaloff and P. Dhamelincout (1980) Phytochemistry, 19, 1943